شبكة المعلومات الجامعية

بسم اللّه الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم باللّه العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

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SIMULATION AND TECHNO-ECONOMIC EVALUATION OF BIO-LUBRICANTS PRODUCTION PROCESS FROM WASTE COOKING OIL

By

Reda Zein Korany Hussein

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
DOCTOR OF PHILOSOPHY
in
Chemical Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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SIMULATION AND TECHNO-ECONOMIC EVALUATION OF BIO-LUBRICANTS PRODUCTION PROCESS FROM WASTE COOKING OIL

Key Words:
Bio-lubricant; Waste cooking oil (WCO); Dioleoyl ethylene glycol; Eco-friendly; Economic feasibility

Summary:

The present work aims to study the production of bio-lubricants from waste cooking oil. In addition, economic feasibility of bio-lubricants production process in Egypt is presented.

The bio-lubricant produced in the present work is a potential biodegradable lubricant that could be used in industrial applications. Its properties were compared to different ISO viscosity grade lubricants and it was found that it complies with ISO VG68 specifications with better low temperature applicability.

An economic assessment for the process application in Egypt was also performed based on the results of process simulations and design calculations. The process showed positive after tax rate of return (ROI %) and a very low payback period (0.24 year) with bio-lubricant selling price equal to the petroleum lubricant. In addition, it was found that the bio-lubricant could be sold with a challenging price and the process would still be profitable from the payback period point of view.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Reda Zein Korany Hussein Date:…./…./2021

Signature:

Dedication

I dedicate my thesis to my parents may God bless their souls; my husband “Haytham Ragheb”; and to my sons “Zein” and “Youssef”.

Acknowledgments

I want to thank God for all his blessings and for giving me the power and time to complete this work.

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